

CLAIMS

What is claimed is:

1. A solar cell structure having a solar cell unit structure comprising:
a heat sink;
a solar cell having a front side, a back side, and a solar-cell projected area coverage on the heat sink, wherein the solar cell comprises an active semiconductor structure that produces a voltage between the front side and the back side when the front side is illuminated; and
an intermediate structure disposed between and joined to the back side of the solar cell and to the heat sink, and having an intermediate-structure projected area coverage on the heat sink, wherein the intermediate structure comprises
a by-pass diode having a diode projected area coverage on the heat sink.
2. The solar cell structure of claim 1, wherein the diode projected area coverage on the heat sink is less than the solar-cell projected area coverage on the heat sink, and wherein the intermediate structure further comprises
a substrate coplanar with the by-pass diode.
3. The solar cell structure of claim 1, wherein the diode projected area coverage on the heat sink is less than the solar-cell projected area coverage on the heat sink, and wherein the intermediate structure further comprises
a substrate coplanar with the by-pass diode and having a substrate projected area coverage on the heat sink such that the diode projected area coverage on the heat sink and the substrate projected area coverage on the heat sink taken together are not less than the solar-cell projected area coverage on the heat sink.
4. The solar cell structure of claim 1, wherein the diode projected area coverage on the heat sink is less than the solar-cell projected area coverage on the heat sink, wherein the substrate has a substrate notch cut therefrom, and wherein the by-pass diode is received into the substrate notch.

5. The solar cell structure of claim 1, wherein the intermediate-structure projected area coverage on the heat sink is not less than the solar-cell projected area coverage on the heat sink.

6. The solar cell structure of claim 1, further including
an intra-unit electrical connection structure operable to electrically interconnect the solar cell and the by-pass diode in an electrical anti-parallel relation.

7. The solar cell structure of claim 1, wherein the back side of the solar cell is substantially planar.

8. The solar cell structure of claim 1, wherein the solar cell structure includes at least one additional solar cell unit structure as set forth in claim 1, and further including
a circuit electrical connection structure operable to electrically interconnect each of the solar cell unit structures in series.

9. The solar cell structure of claim 1, wherein the solar cell structure includes a joint between the intermediate structure and the heat sink, and wherein the joint comprises a metallic trace deposited upon a dielectric layer.

10. The solar cell structure of claim 1, wherein the solar cell structure includes a joint between the intermediate structure and the heat sink, and wherein the joint comprises a PC board having a metal trace on a face thereof.

11. A solar cell structure having a solar cell unit structure comprising:
a heat sink;
a solar cell having a front side, a back side, and a solar-cell projected area coverage on the heat sink, wherein the solar cell comprises an active semiconductor structure that produces a voltage between the front side and the back side when the front side is illuminated;
an intermediate structure disposed between and joined to the back side of the solar cell and to the heat sink and having an intermediate-structure projected area coverage on the heat sink, wherein the intermediate structure comprises

a by-pass diode having a diode projected area coverage on the heat sink that is less than the intermediate-structure projected area coverage on the heat sink, and

a substrate coplanar with the by-pass diode and having a substrate projected area coverage on the heat sink such that the diode projected area coverage on the heat sink and the substrate projected area coverage on the heat sink taken together are not less than the solar-cell projected area coverage on the heat sink; and

an intra-unit electrical connection structure operable to electrically interconnect the solar cell and the by-pass diode in an electrical anti-parallel relation.

12. The solar cell structure of claim 11, wherein the back side of the solar cell is substantially planar.

13. The solar cell structure of claim 11, wherein the solar cell structure includes at least one additional solar cell unit structure as set forth in claim 10, and further including

a circuit electrical connection structure operable to electrically interconnect each of the solar cell unit structures in series.

14. The solar cell structure of claim 11, wherein the solar cell structure includes a joint between the intermediate structure and the heat sink, and wherein the joint comprises a metallic trace deposited upon a dielectric layer.

15. The solar cell structure of claim 11, wherein the solar cell structure includes a joint between the intermediate structure and the heat sink, and wherein the joint comprises a PC board having a metal trace on a face thereof.

16. A solar cell structure having
at least two solar cell unit structures, each solar cell unit structure comprising:
a heat sink,
a solar cell having a front side, a back side, and a solar-cell projected area coverage on the heat sink, wherein the solar cell comprises an active semiconductor structure that produces a voltage between the front side and the back side when the front side is illuminated,

an intermediate structure disposed between and joined to the back side of the solar cell and to the heat sink and having an intermediate-structure projected area coverage on the heat sink, wherein the intermediate structure comprises

a by-pass diode having a diode projected area coverage on the heat sink that is substantially the same as the intermediate-structure projected area coverage on the heat sink, and

an intra-unit electrical connection structure operable to electrically interconnect the solar cell and the by-pass diode in an electrical anti-parallel relation; and

a circuit electrical connection structure operable to electrically interconnect each of the solar cell unit structures in series.

17. The solar cell structure of claim 16, wherein the intermediate-structure projected area coverage on the heat sink is not less than the solar-cell projected area coverage on the heat sink.

18. The solar cell structure of claim 16, wherein the back side of the solar cell is substantially planar.

19. The solar cell structure of claim 16, wherein the solar cell structure includes a joint between the intermediate structure and the heat sink, wherein the joint comprises a metallic trace deposited upon a dielectric layer, and wherein the circuit electrical connection structure is accomplished in part through the metallic trace.

20. The solar cell structure of claim 16, wherein the solar cell structure includes a joint between the intermediate structure and the heat sink, wherein the joint comprises a PC board having a metal trace on a face thereof, and wherein the circuit electrical connection structure is accomplished in part through the metallic trace.